

REMARKS

This paper is submitted in response to the Office Action mailed June 15, 2005, for the above-referenced application. Applicants respectfully request consideration of the following remarks.

The rejection of claims 1, 2, 5-11, 13, 14, 16, 18 and 19 under 35 U.S.C. 103(a) as being unpatentable over Hsueh et al. "Real-time 3D topography by speckle image correlation" (hereinafter "Hsueh") in view of U.S. Patent No. 5,699,112 to Bacs (hereinafter "Bacs") is hereby traversed and reconsideration is respectfully requested. To properly reject claims under 35 U.S.C. §103, it is incumbent upon the examiner to establish a factual basis to support the legal conclusion of obviousness. The examiner must provide a reason why one having ordinary skill in the pertinent art would have been led to modify the prior art or to combine prior art references to arrive at the claimed invention. Such reason must stem from some teaching, suggestion or implication in the prior art taken as a whole as would be understood by one having ordinary skill in the art. Further, prior art references cannot be properly combined where such combinations would render the prior art references inoperable for its intended purpose.

Independent claim 1 recites an imaging system for imaging a target in three dimensions. The system includes a light projection source that projects a beam of light onto the target. An image acquisition subsystem acquires at least two images from light reflected by the target, the image acquisition subsystem comprising a moveable aperture. A correlation processor processes the acquired images according to a sparse array image correlation process. Claims 2, 5 and 6 depends from independent claim 1.

Independent claim 7 recites an imaging method for imaging a target in three dimensions. A beam of light is projected onto a target. At least two images are acquired from light reflected by the target through a lens. An aperture element defines a moveable aperture and a camera disposed along an optical axis. The acquired images are processed according to a sparse array image correlation process. Claims 8 and 9 depend from independent claim 7.

Independent claim 10 recites an imaging method for imaging a target in three dimensions in an imaging system having a lens, an aperture element and a camera disposed along an optical axis. A beam of light is projected onto the target. The aperture element is rotated such that an opening of the aperture element offset from the optical axis is set to a first position. A first image is acquired at the camera from light reflected by the target through the lens and the aperture opening at the first position. The aperture element is rotated such that an opening of the aperture element is offset from the optical axis and set to a second position. A second image is acquired at the camera from light reflected by the target through the lens and the aperture opening at the second position. The acquired images are processed according to an image correlation process to resolve three dimensional components of the target. Claims 11-15 depend directly or indirectly from independent claim 1.

Independent claim 16 recites an imaging system for imaging a target in three dimensions. The system includes a light projection source that projects a beam of light onto the target. An image acquisition subsystem acquires at least two images from light reflected by the target, the subsystem comprising a lens, an aperture element and a CCD element disposed along an optical axis where the aperture element defines an opening offset from the optical axis and the image

acquisition subsystem further includes rotation means for rotating the aperture element about the optical axis such that the at least two images are acquired at the CCD element sequentially from different angles. A correlation process processes the acquired images according to an image correlation process. Claims 17-20 depend directly or indirectly from independent claim 16.

The Hsueh reference discloses a speckle image correlation method for application to 3D topography at ultra-high speeds. The Examiner admits that Hsueh does not disclose a moveable aperture, citing Bacs to cure this deficiency.

The Bacs reference discloses an imaging stabilizing apparatus including a lens aperture positioned adjacent a camera lens. A motion sensor, mounted to the camera, generates signals indicative of spurious camera motion which is utilized to produce movements of the lens aperture transversely to the lens axis in directions opposite to spurious camera motions.

Applicant respectfully submits, however, that there is no motivation to combine the teachings of the Hsueh reference with the Bacs reference. Bacs is expressly directed to correcting for spurious *camera* motion to stabilize an image focused on an imaging plane. It is not directed to imaging systems for resolving 3D topography as described by Hsueh (or the imaging system and method for imaging a target in three dimensions as is presently claimed by Applicant). The 3D topography system disclosed by Hsueh addresses image correlation speed for fast triangulation reconstruction to resolve 3D coordinates of an object. There is no suggestion in Hsueh of a system or method for addressing spurious camera motion, because the acquisition and subsequent processing of multiple images obviates the need to correct for

spurious camera motion. Nor is there suggestion in Bacs of a system or method for resolving 3D topography of a target object because Bacs is directed to systems for acquiring stable, two-dimensional images of a target. Consequently, Applicant respectfully submits that there is no motivation to combine the Hseuh and Bacs references to produce Applicant's claimed invention that includes a system and method that utilizes a moveable aperture to acquire images that are processed by a correlation processor to image a target in three dimensions.

In view of the above, Applicant respectfully submits that the Hseuh and Bacs references do not teach or fairly suggest every element of Applicant's claimed invention. Accordingly, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

The rejection of claims 12, 15, 17 and 20 under 35 U.S.C. 103(a) as being unpatentable over Hsueh in view of Bacs and further in view of U.S. Patent No. 5,850,485 to Hart (hereinafter "Hart") is hereby traversed and reconsideration is respectfully requested because Hart does not overcome the above-noted deficiencies of the Hsueh and Bacs references. Specifically, the Hart reference does not provide any motivation to combine the Hsueh and Bacs references to produce Applicant's presently claimed invention. Consequently, Applicant refers to the above discussion with respect to the lack of a motivation to combine the Hsueh and Bacs references and respectfully requests that this rejection be reconsidered and withdrawn.

Based on the above, Applicant respectfully requests that the Examiner reconsider and withdraw all outstanding rejections and objections. Favorable consideration and allowance are earnestly solicited. Should there be any questions after reviewing this paper, the Examiner is invited to contact the undersigned at 617-248-4801.

Respectfully submitted,
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Date: December 13, 2005

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